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Political instability and human development in CEMAC Zone: Pedroni panel cointegration analysis

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ABSTRACT: The paper intends to examine the effects of political instability on human development using Panel data for CEMAC countries collected from 1996-2019. After exploring some issues on political instability/ human development and reviewing the relevant literature, the study employs Pedroni's Panel cointegration testing approach to verify the existence of the long-run relationship. Pairwise Correlation for multicollinearity and Im-Pesaran-Shin unit root were conducted as a pre-estimation test. The model was estimated using the random and fixed effect models, and only the latter was appropriate for interpretation, given that the Hausman test was significant. Tests for normalities, heteroscedasticity and autocorrelation were inevitably verified as postestimation tests. Results of the study report a moderate correlation between social unrest and human development but a strong correlation between the log of military expenditure and human development in CEMAC with the respective coefficients of 0.539 and 0.785. Importantly, there is no serious problem of multicollinearity, and then all the variables are stationary at levels. Pedroni and Kao test indicates the existence of long run panel cointegration for the within and between dimensions of the panel as the null hypothesis of no co-integration is rejected. Hausman's specification test with a p-value less than 0.05 implies that the fixed effect model is more appropriate for the data. Results of the fixed effect model report a positive and highly significant effect of military expenditure on human development. Meanwhile, the effect of social unrest is negative and also significant in the sub-region. The results suggest that governments and other stakeholders could foster human development with the CEMAC subregion by increasingly and properly sanctioning military expenditure, and equally by stepping up their efforts to reduce social unrest of all forms.

Keywords: CEMAC, human development, military expenditure, social unrest.

INTRODUCTION

Over the past decades, the determinants of human development have attracted increasing attention in both theoretical and applied research, though the process underlying human development has been incompetently conceptualised. This can be attributed to the lack of a generalized or unifying theory as well as the narrow-minded way economists approach this domain. There is a broad consensus that the Central Africa Economic and Monetary community is one of the less developed nations in the world and has continually faced an increase in the level of political instability. Political instability in the CEMAC country results under development thereby affecting production, savings, investment, growth, development and poverty (Aisen and Veiga, 2013). Like other developing countries, most of the people in the sub-region still live below the poverty line and are even more persistent than the other developing countries in spite of their rich endowment in natural resources.

In an attempt to reduce the number of people living below the poverty line in the world, the United Nations (UN) set up the Millennium Development Goals (MDGs) in 2000 which was latter modified as Sustainable Development Goals (SDGs) in 2012 to meet up with environmental, political and economic challenges of the world. Despite all

efforts to achieve a development breakthrough by 2015, countries of the CEMAC sub-region are still facing sluggishness in economic performance, including human development. According to the Human Development Report (HDR) of 2006, Human development in CEMAC had remained stagnating, and life expectancy in the region was lower than 30 years ago. The subregion is said to be losing around one third of human development outcomes, higher than any other developing regions, to that which concerns inequalities in health, education and economic opportunities. Around one-third of children under the age of five are malnourished. Over 35 percent of adults are illiterate. Some 70 percent of working adults earn less than $3.10 per day (HDR, 2016). This unsatisfactory economic development trend has contributed to the low living standards in CEMAC countries in spite of the availability of a large endowment of natural resources in the region.

Most developing countries with those of CEMAC zone inclusive have witnessed a very slow rate in human development coupled with increasing high frequency of political instability since their independence in the 1960s. The countries of the CEMAC region have managed to bring down a number of armed conflicts, as witnessed by a decrease in the number of coups from 20 per decade within the period of 1960-2000 to 6 per decade within 2000-2010 and 4 within the 2010- 2020 decade (Systematic Peace, 2021). Despite this improvement, there are still a significant number of armed conflicts, and the risk of cross-border contamination is high as most countries have conflicts with neighboring towns. Moreover, there have still been spikes of violence, sometimes wide spread, in recent years and even in countries that were considered more stable (Dumitru and Hayat, 2015). To combat some of these signals of political instability, the state budget for defense has been on the rise and the expense of that of other vital sectors such as education, health and agriculture.

A critical view of human development for the sub-region reveals that the human development indicators, on average, lag behind that of other African countries. Central African Republic, with a lower school enrolment of barely 21.8 percent, and a sanitation rate in Congo of barely 15%, among others, is a greater call for concern. World Bank's statistics for 2019 report that, on average in CEMAC, secondary school enrolment rate was 49%, infant mortality rate of 63%, sanitation rate 26%, life expectancy 58, clean water usage 68% and HDI of 0.521 are clear indications that human development is lagging behind world average.

Most studies that focus on political instability in cross-country panel regressions have encountered controversial results due to conceptual variation and empirical problems. Therefore, it is essential to reconsider the fundamental features of political instability and see what will happen to the empirical results when these issues are addressed by using different definitions and data sources, as well as appropriate econometric estimation techniques. The improvement in CEMAC countries' intuitional quality has lagged behind the world's average. The overall score has rather deteriorated from -0.63 in 2002 to -0.67 in 2013 (WDI, 2019), which mainly reflects a lower score of political stability. Establishing a relationship between political instability and human development in this sub using recent data is, therefore, a call for concern. As a way to overcome the challenge, this paper amends the previous research work in the domain by investigating the effects of political instability on human development in CEMAC countries using a recent date set. Specifically:

- To assess the effect of social unrest on human development in the CEMAC sub-region.
- To investigate the effect of military expenditure on human development in the CEMAC.

Having introduced the paper in Section 1, the rest of the paper is arranged in the following order: Section 2 focuses on theoretical and empirical literature, whereas Section 3 describes data and econometric techniques used in investigating short- and long-run relationships between the variables; Section 4 presents and discusses the economic results, meanwhile Sections 5 concludes the paper.

LITERATURE REVIEW

Theoretical review

The theoretical literature in this paper is partitioned into two. The first strand focuses on theories which explain the causes of political instability, and the second strand is on the link between political instability and human development.

A good number of theories exist in literature on possible causes of violence and other forms of political instability such as Poverty Breeds Terrorism, Relative Deprivation, Social mobilization theory, Rent Seeking Theory, and institutional theory. Poverty Breeds Terrorism, also described as the "rooted-in-poverty" hypothesis, stems from the belief that impoverished countries teeming with poorly educated, unemployed masses qualified by a widening gap between the rich and poor combined with low literacy rates are fermentation tanks for dangerous and violent militants. The low levels of economic and social development increase the appeal of political extremism and encourage political violence and instability (Piazza, 2006). While the empirical evidence refutes this hypothesis, it continues to be popular, even with prominent US military and government officials. The ideas encompassed within this hypothesis will be henceforth dubbed "popular wisdom". It will encompass the beliefs that political violence is a result of poverty, poor education and acute unemployment.

Ndokang and Tsambou (2019) disagree with the fact that poverty is the major variable for terrorism and violent conflict and point out that most terrorists are not impoverished but rather are “well-educated and middle class”. He observes that while the world overall is coming out of poverty, the incidences of terrorism are not falling as would be expected. Some pundits hold that the truly impoverished are too busy working to make ends meet rather than engaging in violent political action. The case of Algeria’s relative wealth and high violence is just one example that contradicts the Poverty-Breeds-Terrorism hypothesis. Therefore, there must be some other motive for terrorism outside of poverty; being poor, in and of itself, is not a sufficient motivator for violent conflict.

The theory of Relative Deprivation postulated by Robert Gurr in 1980 recognizes the pitfalls in attributing political violence to poverty alone and purports that widespread discontent provides a general impetus to collective violence. According to this theory, violence pops in when there is a discrepancy between “expectation and aspiration. Any aspiration that does not materialize brings discontentment and is likely to spark violence (Webber, 2007). The theory, made popular by, suggests that discontent manifested by the failure to aspire or receive can lead to political violence. Gurr’s three-step model illustrates how discontent grows into violent action: “first the development of discontent, second the politicization of that discontent, and finally its actualization in violent action against political objects and actors”. Gurr iterated that it is not the inadequacy of absolute resources but rather the perception of the people as to how fair their share is which may spark violence. Criminologists Webber and Ross acknowledge that relative deprivation theory is useful in identifying violent tendencies but is not a sufficient explanation for the rate of violent mobilization nowadays.

Rent Seeking Theory, coined by David Ricardo in the 19th century, upholds that an attempt to obtain economic rent by manipulating the political or social environment in which economic activities occur, rather than creating new wealth especially by means of securing beneficial subsidies. The Tullock paradox (after Tullock, 2008) is that rent seekers wanting political favour can bribe politicians at a cost much lower than the value of the favour to the rent seeker. People lobby the government for privileges in order to be given wealth that has already existed. Rent seeking could also apply to corruption of bureaucrats (administrators) who solicit and extract bribes or rent for using their legal but discretionary authority for awarding benefits to clients.

Turning to the effect of political instability on human development, the dependency school, on one hand, found that the differences are a result of interdependency between countries; the Neo-Classical school, on their part, found that factors of production are the main determinant of economic growth. Becherair and Tahtane (2017) iterated that education, health and economic growth play a vital role in determining human development in a country. In the Keynesian submission, defense expenditure, which is an integral part of government expenditure, serves as an injection to the economy and, as such, could positively stimulate the economy through the multiplier mechanics. The increase in any of the aggregate demand variables will increase the capital stock in the society, which will lead to higher profit and may induce higher investment, thus generating short-run multiplier effects and higher growth rates on the aggregate economy. Benoit (1978) argued that with the increase in military expenditure, economic growth can be promoted by increasing the human capital capabilities of the workforce through provisions of education where the military industries may provide valuable skills. There are also externalities in defense spending that are crucial to economic growth, like the provision of road infrastructure, which can be used by both the military and civilians (Barro et al., 1995).

On the contrary, arguments equally suggested that there exists a negative relationship between defense spending and economic growth. Levine and Renant (1992) argued that, since defense spending is financed by taxation, taxation will not only reduce the amount of resources available to the private sector but equally affect relative prices like real wage and real interest rates, which ultimately distorts economic decisions. Moreover, this negative trend may have a negative impact on economic growth. Defense spending may also crowd out not only private investment but also other government spending that could stimulate human capital formation (Sheikh *et al.,* 2017). Also, defense spending could create bottlenecks in the demand for highly qualified labor and take resources away from civilian research and development activities. Given that the government sector is prone to low productivity, the diversion of resources away from civilian to military purposes may impede long-term country productivity, technological projects and growth.

Empirical review

Several studies have empirically investigated the effects of political instability on human development. Aisen and Veiga (2013) examined the effects of political instability on economic growth. Using the system-GMM estimator for linear dynamic panel data models on a sample covering up to 169 countries and 5-year periods from 1960 to 2004, they found that higher degrees of political instability are associated with lower growth rates of GDP per capita. Regarding the channels of transmission, they find that political instability adversely affects growth by lowering the rates of productivity and, to a smaller degree, physical and human capital accumulation. Finally, economic freedom and ethnic homogeneity are beneficial to growth, while democracy may have a small negative effect.

Igwe (2011) examined the link between violent conflict

and the MDGs in Africa with particular emphasis on full-scale armed conflict between state and non-state armed groups within a country (civil war), which can include violence uprising against a state neither legitimate nor illegitimate. He, however, acknowledged the fact that the number of conflicts between sovereign states in Africa had declined, although conflicts between different groups within the same country were on the rise due to tensions rooted in inequalities of power aligned with division along ethnic, religious or racial lines. To him, many of the CEMAC countries which were in violent conflict were in danger of failing to meet most of the goals by 2015; violent conflicts have caused great suffering and the loss of numerous human lives. They have destabilized governments, destroyed the livelihood of poor people, undermined national economies, damaged infrastructure, led to the exodus of people, and disrupted the delivery of education and health services. Therefore, preventing conflict, resolving conflict and supporting post-conflict reconstruction are vital prerequisites for the attainment of the MDGs.

Leon (2012) examined the persistent influence of exposure to political instability on human capital accumulation by using the variation of conflict location and birth cohorts to identify long- term and short-term effects of civil war on educational attainment. He found that, conditional on being exposed to violence, the average person accumulates 0.13 fewer years of education as an adult, and the effects are stronger in the short run than in the long run, thereby comparing children within the household.

Abu *et al.* (2015) investigated the causal relationship among political instability, corruption and economic development in the ECOWAS using the Granger causality test within a multivariate co-integration and error-correction framework from 1996 to 2012. They found that political instability Granger-causes economic development in the short term, while political instability and economic development Granger-cause corruption in the long term. In addition, they employed the forecast error variance decomposition and impulse response function analyses to investigate the dynamic interaction between the variables. The results demonstrate positive unidirectional Granger causality from political instability to economic development in the short term and positive unidirectional Granger causality from political instability and economic development to corruption in the long term in ECOWAS countries.

Feyzabadi *et al.* (2015) used a random effects regression model to investigate the relationship between peace and life expectancy among world countries between 2007 and 2012. They adjusted the association for the Gross National Income (GNI) per capita and education index (EI). Data were obtained from the Institute for Economics and Peace (IEP) and the UNDP (United Nations Development Programme (UNDP) for 158 countries. They found that the global peace index has a negative and statistically significant effect on life expectancy. This association was also significant even after the adjustment for education index, Gross National Income, and both education index and Gross National Income. The full model showed that around 0.61 of the variation of life expectancy among countries may be explained by the global peace index, education index and gross national income per capita. The contribution of peace as a global determinant of life expectancy was empirically considerable even after the adjustment for the economic and education levels of countries.

Lobojo (2015) examines the relationship between conflict and the socio-economic under-development of South Sudan. The study used both primary and secondary methods of data collection. In the primary data, both quantitative and qualitative techniques were used, while the secondary method used desktop review and journal. The quantitative data was administered to 120 respondents, qualitative data was collected through five key informant interviews and 2 focus group discussions. The quantitative data (questionnaires) was analysed with the help of SPSS (Statistical Package for Social Sciences). The results obtained indicated that the majority of South Sudanese nationals have experienced various armed conflict fought between Sudan and South Sudan degenerating into general insecurity and therefore, retarded socioeconomic development, poverty, humanitarian crises and disruption of basic service delivery to the people and communities in South Sudan. Armed conflicts caused an immense destruction of both physical and economic infrastructures, rendering the economy weak while leaving the civil population in a state of destruction and impoverishment because their means of survival are destroyed.

Matta *et al.* (2017) use synthetic control methodology, which constructs a counterfactual in the absence of political instability. The authors estimate the output effect of 38 regime crises in the period 1970-2011, with a crucial factor being whether crises are accompanied by mass civil protest. They found that when crises are accompanied by mass civil protest, it results in an immediate fall in output, which never recovered in the subsequent five years and that in crises unaccompanied by protest, there are usually no significant effects on economic activities. Makrem and Faycel (2018) investigated the relationship between democracy and growth in a sample of 79 countries over the period 1984-2008 using the generalized method of moments (GMM) developed for dynamic panel models to verify whether the outcome depends on political stability. The result of their study reveals that political stability is a key variable in determining economic growth as the effect of democracy on growth is statistically insignificant in the absence of a stable political framework.

Gakpa (2019) examines the impact of the interaction between political instability and foreign direct investment

(FDI) on economic growth for 31 sub-Saharan African (SSA) countries from 1984 to 2015. Political instability was captured using an aggregate indicator constructed using a principal component analysis of several political risk indicators drawn from the ICRG database and use was made of a dynamic panel procedure and the triple least squares technique in estimating the simultaneous equation model over the period where the author found that political instability affects economic growth both directly and indirectly through its impact on foreign direct investment. Gakpa discovered that political instability crises hinder economic growth driven by foreign direct investment.

From the literature review, we can, therefore, presume that political instability has negative effects on growth performance irrespective of whether we are using time series data, cross-section data, or panel data. It is, therefore, necessary to proceed with the empirical investigation of this relationship in the case of the CEMAC region.

METHODOLOGY

This paper adopts an export factor design since the research seeks to determine whether specific levels of political instability affect human development and the study is limited to political instability and human development in the CEMAC which constitute of six countries (Cameroon, Gabon, Chad, Republic of Congo, Equatorial Guinea, Central African Republic).

Data type and source

Use was made of annual panel data for the main variable of interest spanning from 1996 to 2019. Secondary data was obtained from four main sources. Data for Human development taken as HDI were obtained from the United Nations Development Program (UNDP). Data for Social unrest were obtained from World Governance Indicator (WGI), and those of Military expenditure were gotten from SIPRI (2020)**.** Then, data for labour force participation rate, population density, gross domestic saving, and gross domestic investment are collected from World Development Indicators (WDI) and data for inflation rate are from International Financial Statistics (IFS).

Model specification

The model of human development captured in this study by human development index, which is specified as a function of political stability while controlling for other variables, specified as:

$$HDI = F(PI, C) \ldots\ldots (1)$$

Where HDI is the human development index and C is a vector of other variables that affect human development (controlled variables). Adapting from and modifying from the Akinkugbe and Yinusa (2009), the more specific econometric model of human development in view of testing the research hypotheses of the study is specified as:

$$HDI_{it} = \beta 0 + \beta_1 SUR_{it} + \beta_2 MILLE_{it} + \beta_3 INF_{it} + \beta_4 PD_{it} + \beta_5 GDS_{it} + \beta_6 LEPR_{it} + \beta_7 GFCF_{it} + \varepsilon it \ldots\ldots\ldots (6)$$

Where: I = denote the country (1 to 6) and Subscript t refers to the year (1996 to 2019), HDI = Human Development Index, SURit = indicator for social unrest for i countries over the period t, MILLEit = indicator for expenditure on military for i countries over the period t, PD = Population density, LFPR = Labour force participation rate, GFCF = Gross fix capital formation, GDS = Gross domestic savings, INF = Inflation rate, βs = Parameters to be estimated, and ε = The error term.

Variables description and their measurement

Human development index (HDI)

HDI is a composite index that measures the extent to which human development has been improved. HDI is based on the three indicators of human development. The value of this index ranges from 0 to 1, where 0 means a low level of human development and 1 shows a high level of human development. The data for this variable is taken from the United Nations Development Program.

Social Unrest (SUR)

Political instability captured using social unrest indicator (political stability index) measures the perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. It indicates the absence of political stability and the prevalence of violence/terrorism. This variable could be measured using the estimate of governance, which ranges from approximately -2.5 to 2.5, where -2.5 means weak governance performances as an indicator for high prevalence of social unrest and +2.5 shows strong governance performances (low level of social unrest). The data for this variable is taken from Worldwide Development Indicators. As deduced from the work of Aisen and Veiga (2013) and Lobojo (2015), an inverse relationship between social unrest and HDI is expected.

Military Expenditure (MILE)

The classical economists uphold that the upsurge of military expenditure retards economic growth as higher

military spending lowers the level of private investment, domestic savings, and consumption due to fall in aggregate demand. And that increased military spending reduces the total accumulation of existing resources available for other domestic usages, escalates the rate of interest, reduces productivity and therefore becomes more harmful to economic prosperity (Borch and Wallace, 2010; Azam, 2020). Even though Keynesians found positive externalities through the development of the military sector on the civilian. We hypothesize in line with the classical that military expenditures impact HDI negatively in the ongoing study.

Inflation rate

Inflation, as measured by the consumer price index, reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used. A negative coefficient is expected, as high inflation has been found to negatively affect growth (Edison *et al*. 2002; Elder, 2004).

Population density

It is measured in terms of the number of persons per square kilometer. Population density is midyear population divided by land area in square kilometers and is therefore expected to play a positive role in human development. The data for this variable is taken from Worldwide Development Indicators, Food and Agriculture Organization, and World Bank population estimates.

Gross domestic savings

Gross domestic savings are calculated as GDP less final consumption expenditure (total consumption). Evidence shows that no country in the world has achieved economic prosperity without having a high savings rate. This paper thus hypothesizes a positive effect of saving on HDI in the CEMAC zone.

Labor force participation rate

It is the proportion of the population ages 15-64 that is economically active: all people who supply labor for the production of goods and services during a specified period. This variable takes into consideration the activeness of the labor force. A country with a high labor force participation rate will normally have a high human development index, and this paper expects the positive relationship to hold in CEMAC too.

Gross fixed capital formation (% of GDP)

Gross fixed capital formation includes land improvements, plant, machinery/equipment purchases, and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. According to the 1993 SNA, net acquisitions of valuables are also considered capital formation. It is taken as gross investment expressed as a percentage of GDP. When gross fix capital formation is increased, human development will subsequently increase since it comes to increase the goods and services produced in that country. The variable is presumed to have a positive effect on human development.

Model estimation following Pedroni's Panel co-integration technique

Analytical technique employs Pedroni's Panel co-integration tests which is conveniently conducted in this paper in three steps: Pre-estimation tests (multicollinearity/unit root), model estimation using either random effect model or fixed effect model depending on the results of Hausman's test, and post estimation tests (normalities, heteroscedasticity and autocorrelation).

Pre-estimation tests

Multicollinearity test based on correlation matrix: A preview observation of the variables is made by looking at the pairwise correlation between independent variables and retaining only variables with weaker correlation.

Stationarity tests

Stationarity tests permit us to verify if a series is stationary or not. Non-stationary data cannot be forecasted. The model obtained by non-stationary data may be spurious in that they may indicate a relationship between two variables which does not reflect the reality. Recent work by Pesaran (2021) suggests another approach for testing for unit roots, one that allows for more heterogeneity of behavior than that allowed for by the conditional maximum likelihood or least squares dummy variable approach and also to ensure that our result reflects the classical principle and converges towards the reality. In this light, stationarity test is conducted for all the variables in this study using Im-Pesaran Shin unit root test. The test requires that for a variable to be stationary, the absolute p-value should be inferior to 10 percent.

Panel co-integration estimation technique

Panel co-integration estimation is a technique of

estimation which takes into consideration both the individual and the time or temporal dimension. Several tests were developed by Kao (1999) and Pedroni (2004) to examine the existence of co-integration in a multivariate framework. Their proposed statistics test the null hypothesis of no co-integration versus the alternative of co-integration. The process of testing for co-integration among variables should permit as much heterogeneity among the individual countries of the panel as possible. Panel data used in this paper is data from six countries observed in a certain period.

The panel data model can be estimated using either fixed or random effect techniques. These two techniques have been developed to handle systematic tendency of individual specific components to be higher for some units than for others – the fixed effects estimator is used if the individual specific component is not independent with respect to the explanatory variables while the random effect estimator is used if the individual specific component is assumed to be random with respect to the explanatory variables (Dewan and Hussein, 2001). In order to determine whether fixed effects or random effects estimation is most appropriate, the analysis makes use of the Hausman test (Hausman, 1978). Random effect is appropriate when the pv of the Hausman test exceeds 0.05; meanwhile, Fixed Effect is selected when pv is less than 0.05.

RESULTS

Descriptive analysis

The results presented in Table 1 show the descriptive statistics of the variables. It is observed from the results that, the mean values of all the eight variables used in the study are below 3 except the mean value of Gross domestic savings (GDS) which has to be logged to reduce the scale effect.

Trend analysis

The trend of the human development index (HDI) for all six countries has a rising trend for the period under study, spanning from 1996 to 2019, as observed in Figure 1.

The index for Gabon is the highest throughout the period, followed by that of Equatorial Guinea, Congo, Cameroon, Chad and Central Africa Republic. The HDI for Chad recently fell below that of the Central Africa Republic Military expenditure presented in Figure 2, for most countries in the sub region has fallen in the recent years except that of Cameroon, Central Africa Republic and Gabon.

As of 2018, public expenditure on military upkeep is highest in Cameroon, followed by that of Congo, Gabon, Chad, Equatorial Guinea, and Central Africa Republic in that order. The trend of the political stability index reported in Figure 3 indicates great fluctuations for all the countries with falling overall tendencies for all the six countries of the CEMAC sub-region.

The political index for all the countries falls below zero except for Gabon. This implies that political instability is generally on the rise in CEMAC.

Correlation analysis

To have a previewed knowledge of the relationship between the variables, we constructed the correlation metric to show a preview of the trend of the relationship between the variables used. The results of the correlation metric are, therefore, presented in Table 2.

From Table 2, there is a moderate correlation between social unrest and human development (0.539) but a strong correlation between the log of military expenditure and human development in CEMAC (0.785). Presumably, there is a strong effect of social unrest and military expenditure on human development.

Stationarity test

From the results presented in Table 3, all the variables are stationary at levels. The null hypothesis in the IPs unit root test states that all the series included have unit roots or are non-stationary. If the null hypothesis is rejected, the series is stationary, at least for one panel member. This indicates that all the variables are stationary at levels.

Panel cointegration test

The result of the unit root test conducted in Tale 3 highlights that there is a high possibility that political instability affects human development, given that all the variables of interest were stationary at levels. In order to verify this, the panel Pendroni's and Kao residual co-integration test is effectuated with results provided in Table 4.

The results of the Pedroni panel co-integration test are presented in Table 4. From the test result, the PP and ADF statistics for the within and between dimensions suggest that we reject the null hypothesis of no co-integration. Since the test statistic shows evidence of a long-run relationship, we conclude that HDI and its determinants are co-integrated.

Fixed and random effects Generalized Least Squares (GLS) results

The results of the fixed and random effect panel analysis GLS on the effect of political instability components on human development in CEMAC are presented in Table 5, with results of the fixed effects model in the second column

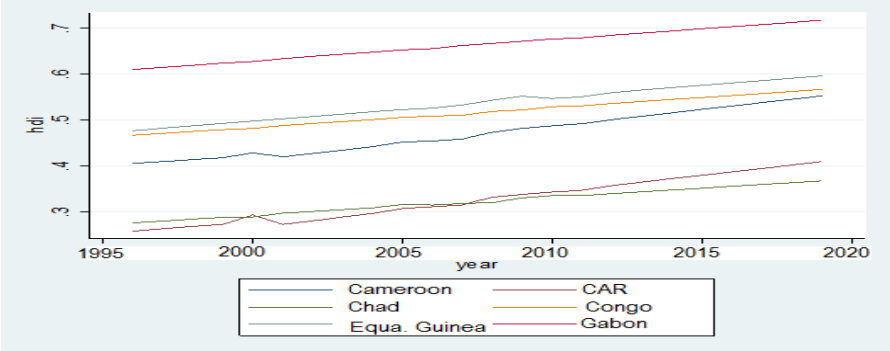

Figure 1. Trend analysis for human development index.

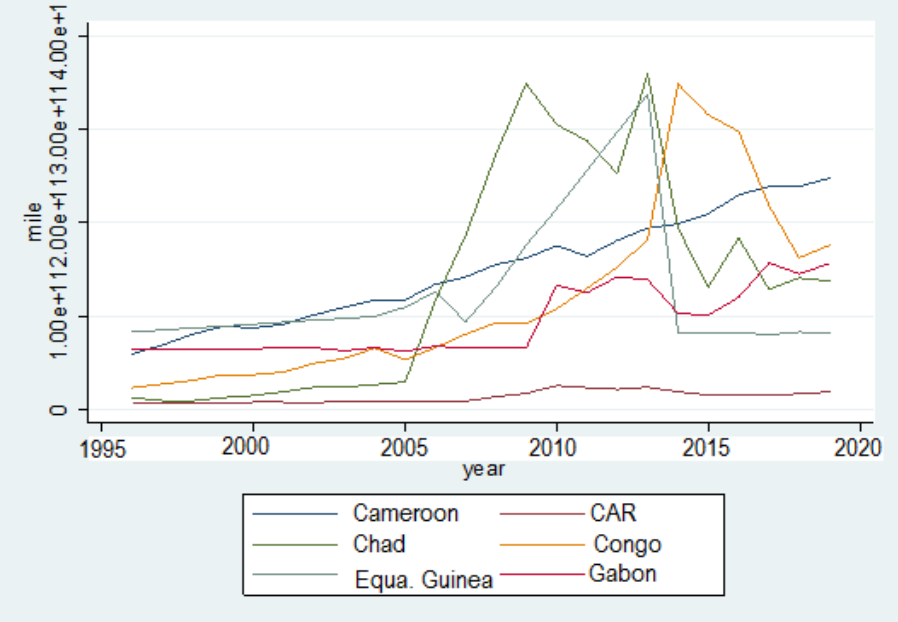

Figure 2. Trend analysis for military expenditure.

and results of the random effect model on the third column. The Hausman specification test is thus used to select the most efficient and consistent model between the two models for interpretation.

Given that the results of Hausman's specification test with the coefficient of 199.28 and p-value less than 0.05, indicates that the hull hypothesis of the test which states that the random effect model is rejected implying that fixed effect model is more appropriate for the study of political instability and human development in CEMAC. The proxy for public expenditure on defense captured in this study as military expenditure is positive and highly significant in influencing human development among the CEMAC countries. The coefficient of military expenditure in the fixed effect model is 0.0408, with the pv< 1 indicating that an increase in military expenditure by 1% for the purpose of maintaining peace can enhance human development by over 4%.

The indicator for the variable of social unrest displays a negative and significant effect on human development with a coefficient of -0.0205. This means that an attempt to lower social unrest by 100 percent in CEMAC will promote human development in the region by two percent. This is significant at a 1% level of significance. Hence, social unrest has an indirect relationship with human development. The indicator for the variable of inflation displays a negative and insignificant effect on human development with a coefficient of -0.0320. This means that an attempt to lower inflation by 1% in CEMAC will demote human development in the region by three percent. This is insignificant at all levels of significance. Hence, inflation has no relationship with human development.

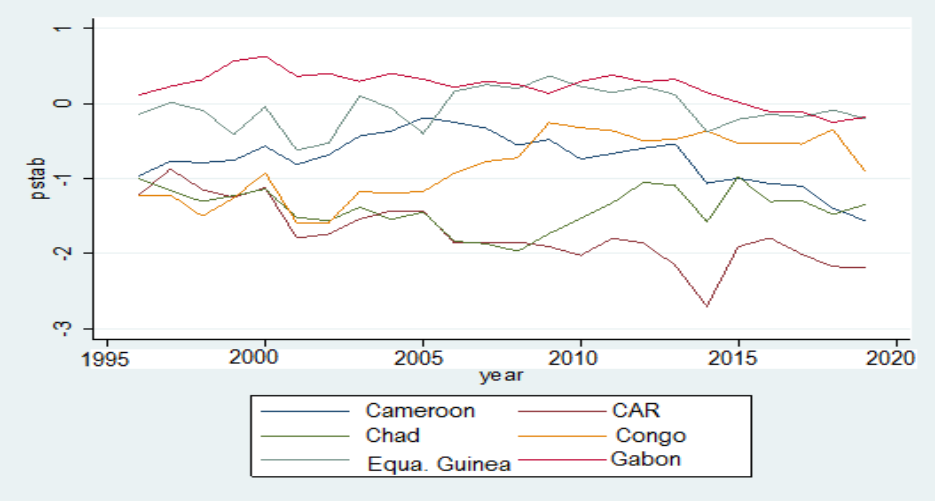

Figure 3. Trend analysis for social unrest.

Table 1. Summary of descriptive statistics of variables.

Variable		Mean	Std.Dev.	Min	Max	Observations
	Overall		0.1256935	0.2591633	0.716821	N = 144
HDI	Between	0.4732435	0.1310046	0.3228344	0.663595	n = 6
	Within		0.0373764	0.404284	0.555013	T = 24
	Overall		8.61e+10	6.24e+09	3.59e+11	N = 144
MILE	Between	1.06e+11	4.91e+10	1.34e+10	1.50e+11	n = 6
	Within		7.34e+10	-1.89e+10	3.36e+11	T = 24
	Overall		0.7620652	-2.699193	0.636521	N= 144
SUR	Between	-0.756819	0.750674	-1.730356	0.228074	n = 6
	Within		0.3284307	-1.725656	0.104964	T = 24
	Overall		3.344892	-8.97474	14.89868	N= 144
INF	Between	2.949736	.8162168	1.924332	4.277313	n = 6
	Within		3.260252	-8.916625	14.44542	T = 24
	Overall		.8790149	0.2596475	4.654917	N =144
PD	Between	2.942617	.8510296	1.612173	4.183992	n = 6
	Within		.4060836	1.590092	3.951154	T = 24
	Overall		24.98296	-40.81475	83.28704	N= 144
GDS	Between	34.24682	24.36579	3.489752	64.70842	n = 6
	Within		11.22254	-22.7841	52.82545	T = 24
	Overall		9.989099	46.51	83.11	N= 144
LFPR	Between	67.07	10.76415	48.94708	79.45042	n = 6
	Within		1.597237	63.60958	71.02292	T = 24
	Overall		12.65262	6.349849	81.05174	N= 144
GFCF	Between	26.40405	8.507685	12.88565	36.80262	n = 6
	Within		9.967435	0.4658863	70.65317	T = 24

Source: Author computation.

Table 2. Pairwise Correlation Matrix.

	HDI	lnMILE	SUR	INF	PD	GDS	LFPR	GFCF
HDI	1.0000							
lnMILE	0.5390	1.0000						
SUR	0.7851	0.4575	1.0000					
INF	-0.0824	-0.0456	-0.1003	1.0000				
PD	0.2415	0.4122	0.5067	0.0416	1.0000			
GDS	0.6710	0.4867	0.6994	0.0741	0.5788	1.0000		
LFPR	-0.7102	-0.1283	-0.6633	0.0365	-0.2924	-0.6274	1.0000	
GFCF	0.3243	0.5081	0.3447	0.1382	0.4298	0.5051	-0.2022	1.0000

Source: Author computation.

Table 3. Im-Pesaran-Shin unit root tests results of variables.

Variables	Statistic (t-bar)	p-value	1% critical value	5% critical value	10% critical value	Decision
HDI	-6.7052	0.0000	-2.320	-2.080	-1.950	I(0)
lnMILE	-4.2194	0.0000	-2.320	-2.080	-1.950	I(0)
SUR	-5.4823	0.0000	-2.320	-2.080	-1.950	I(0)
INF	-4.7848	0.0000	-2.320	-2.080	-1.950	I(0)
PD	-2.3831	0.0113	-2.320	-2.080	-1.950	I(0)
GDS	-5.6235	0.0000	-2.320	-2.080	-1.950	I(0)
LFPR	-2.2304	0.0370	-2.320	-2.080	-1.950	I(0)
GFCF	-2.0894	0.0577	-2.320	-2.080	-1.950	I(0)

Source: Author computation.

Table 4. Panel cointegration test

Pedroni Residual Cointegration Test				**Kao Residual Cointegration Test**	
Within Dimension		**Between Dimension**		**t-stat.**	**Value**
Panel rho-Stat.	3.23	Group rho Stat.	5.84	ADF	-3.50**
Panel PP-Stat.	-19.85**	Group PP-Stat.	-24.88**	Residual variance	13.11
Panel ADF-Stat.	-6.70**	Group ADF-Stat.	-4.13**	HAC variance	4.25

Notes: ** denotes significance at 5%, rejection of the null hypothesis of non-cointegration at 5% level. HAC means heteroscedasticity and autocorrelation consistent.

The indicator for the variable of population density displays a positive and insignificant effect on human development with a coefficient of 0.000582. This means that an attempt to increase population density by 1% in CEMAC will promote human development in the region by 0.0582%. This is insignificant at all levels of significance. Hence, population density has no relationship with human development. The indicator for the variable of gross domestic savings displays a negative and significant effect on human development with a coefficient of -0.00134. This means that an attempt to lower gross domestic savings by 1% in CEMAC will promote human development in the region by 0.134%. This is significant at a 1% level of significance. Hence, gross domestic savings have an indirect relationship with human development.

The indicator for the variable of labour force participation rate displays a negative and insignificant effect on human development with a coefficient of -0.00155. This means that an attempt to lower the labour force participation rate by 1% in CEMAC will demote human development in the region by 0.155%. This is insignificant at all levels of significance. Hence, the labour force participation rate has no relationship with human development. The indicator for the variable of gross fixed capital formation displays a negative and insignificant effect on human development with a coefficient of -0.000311. This means that an attempt to lower gross fixed capital formation by 1% in CEMAC will demote human development in the region by 0.0311%.

Table 5. Fixed and random effects GLS results.

Variables	(FE) Hdi	(RE) Hdi
LNMILE	0.0408***	0.0426***
	(0.00334)	(0.00569)
SUR	-0.0205***	0.0704***
	(0.00665)	(0.0101)
INF	-4.75e-05	-0.000130
	(0.000652)	(0.00142)
PD	0.000582	-0.0445***
	(0.00557)	(0.00672)
GDS	-0.00134***	0.000747**
	(0.000197)	(0.000324)
LFPR	-0.00155	-0.00482***
	(0.00132)	(0.000702)
GFCF	-0.000311	-0.000257
	(0.000225)	(0.000459)
Constant	-0.405***	-0.100
	(0.121)	(0.131)
Observations	144	144
R-squared	0.618	
Number of countries	6	6
Hausman Chi (7)	199.28	p-value = 0.000

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1 (Source: Author computation).

This is insignificant at all levels of significance. Hence, gross fixed capital formation has no relationship with human development.

Everything being equal, human development is -0.405, and it is significant at a 1% level of significance. R-squared shows that about 61.8% of variables across the panel are caused by variables in the model or the independent variables (social unrest and expenditure on defense).

DISCUSSION

The result of the relationship between political instability and human development shows that political instability taken as public expenditure on defense has a positive and significant effect on human development in the CEMAC sub-region. These results are consistent with those of Abdel-Khalek *et al*. (2019), who found a similar result between military expenditure and economic growth in India. Political instability captured using the social unrest indicator (political stability index) has a negative and significant effect on human development on both the fixed effect model and random effect model used in this study. The variable was significant at 1% in both models, indicating that the first research hypothesis on the relationship between social unrest and human development is attained. This implies that social unrest used as a proxy of political stability has a negative and significant effect on human development in CEMAC.

The result of the fixed effect model shows that if social unrest is reduced by one percent, human development will increase by over two percent. The result of the study is in some way in line with that of Aisen and Veiga (2013), who investigated the effects of political instability on economic growth. Using the fixed effect model estimator for linear dynamic panel data models on a sample covering up to 169 countries and 5-year periods from 1960 to 2004, their results show that higher degrees of political instability are associated with lower growth rates of GDP per capita. Regarding the channels of transmission, political instability adversely affects growth by lowering the rates of productivity growth and, to a smaller degree, physical and human capital accumulation. Finally, economic freedom and ethnic homogeneity are beneficial to growth, while democracy may have a small negative effect.

The result is equally consistent with that of Lobojo (2015), who examines the relationship between conflict and the socio-economic under-development of South Sudan and found that armed conflict causes an immense destruction of both physical and economic infrastructures, rendering the economy weak while impoverishing the civil population.

In regard to the second hypothesis of the study, it was found that military expenditure (used as a counter variable for public expenditure on defense) was positive and significant in the model. This, therefore, shows how when the government invest in arms or military expenditure, it often sparks instability in one form or the other, which impacts human development positively in this sub-region. The result is consistent with that of Akçay (2006), Becherair (2017) and Azam (2020).

The joint negative effect of social unrest and public expenditure on defense therefore accounts for very low human development which characterized the CEMAC sub region. To that which concerns urban population, the fixed effect model suggests that urban population has a positive and insignificant effect on human development in the CEMAC countries. Basing the results on the fixed effect model, it can be concluded that there exist a statistically significant positive association between population density and human development in most of the models, suggested that an increase in population enhances human development

Conclusion

This study explores the effects of political instability on human development in the CEMAC countries in order to better explore the effects of political instability on human development where the fixed effect model and random effect model were employed. In order to test the impact of political instability on human development, the direct political instability on human development was traced. The test results revealed that the social unrest variable displays a negative and significant effect on human development with a coefficient of -0.0205. This means that an attempt to lower social unrest by 1% in CEMAC will promote human development in the region by 2%.

Public expenditure on defense indicator has a positive and highly significant effect on human development too. The coefficient of the logarithm of military expenditure in the fixed effect model judged more appropriate for analysis (following Hausman's test result) was 0.0408 with the p-value less than 1. This is evidence that increasing state expenditure on military by 100% and restore or maintain peace and therefore foster human development by about four percent.

Recommendations

Two important policy implications emanate from the results of these findings. The government and other stakeholders should double their efforts to reduce social unrest of all forms as a measure to promote human development in the CEMAC. The governments of the CEMAC region should do this by putting in place strategies to fight against all winds social instability such as violence, strike, overstay in power, man slaughter, conflicts, tension, riots among others, since it makes their economy fragile for investors, disrupt educational and health system upon which human development largely depend. This can be done by fighting against political instability as well as always listening to the cry from the street.

From the results, it is also suggested that military expenditure should be properly used as the outcome on human development is positive. Policy makers should pay attention to political instability in the country and from neighboring countries even if they are not hurt as their human development may suffer negative spillovers from their neighbors. Governments in politically fragmented countries (within CEMAC zone) with high degrees of political instability need to address its root causes and try to mitigate its effects on the design and implementation of economic policies. Only then could countries have durable economic policies that may engender higher human development.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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